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New Category 4 Screening Levels

CL:AIRE has published the C4SL (Category 4 screening levels) reports for vinyl chloride, tetrachloroethene (PCE) and trichloroethene (TCE).

Part 2A of the Environmental Protection Act 1990 was published April 2012 and it introduced a new category based system for dealing with risk assessment including the assessment of the 'significant possibility of significant harm' (SPOSH) whereby Category 1 sites are clearly contaminated and represent a high risk and Category 4 sites are clearly identifiable as low risk and not contaminated land. Defra commissioned a project to develop Category 4 Screening Levels (C4SLs) which have now been published for six contaminants (arsenic, cadmium, chromium VI, lead, benzo(a) pyrene and benzene) using the same Contaminated Land Exposure Assessment (CLEA) methodology risk assessment model software used to develop the soil guideline values (SGV) published by DEFRA and the Environment Agency

The C4SLs are developed for four generic land uses which include residential use with and without home grown produce, allotments, commercial use and public open space. The public open space use is considered under two scenarios, one which is a grassed area of up to 0.05 ha, with 50% bare soil, used regularly by children and close to residential homes so that materials can be tracked back to these properties and the other is park type open space greater than 0.5 ha, predominantly grassed, which has a children's play area and is used for activities such as dog walking.

The Soil and Groundwater Technology Association (SAGTA) is leading a collaborative industry initiative to develop up to 20 additional C4SLs for a range of contaminants which have been selected following a consultative process choosing the contaminants which would be most useful to industry. These are as follows:

Chloroethene (Vinyl Chloride)	Vanadium	Toluene
Cis-1,2-Dichloroethene	Nickel	Ethylbenzene
Trichloroethene	Beryllium	Xylenes (ortho, meta and para)
Trans-1,2-Dichloroethene	Inorganic Mercury	Methyl tertiary butyl ether (MTBE)
Tetrachloroethene	Free Cyanide	Naphthalene
1,2-Dichloroethane	Complex Cyanide	1,2,3-Trimethylbenzene,
1,1,1-Trichloroethane		1,2,4-Trimethylbenzene
		1,3,5-Trimethylbenzene

The reports for vinyl chloride, tetrachloroethene and trichloroethene can be downloaded from the CL:AIRE web page [here](#) together with a short webinar about how C4SLs have been derived and the background to the project.

Dealing with contamination during a ground investigation



The Association of Geotechnical and Geo-environmental Specialists (AGS) published recently a document 'Guidance on dealing with contamination during a ground investigation'. The document is available from the AGS website [here](#).

The information is a short technical note setting out the types of hazards which may be encountered and necessary for a risk assessment, for example chemical, biological and physical hazards, radioactive materials, hazardous vapours and gases, asbestos, non-aqueous phase liquids such as fuels and solvents and unexploded ordinance. Prior to site works it is essential that it is understood what hazards are likely to be on site although often such information is collated in a desk study only. Perhaps the most helpful information provided is a list of issues to consider for safe working procedures, for example the need for decontamination facilities and boot washing, bagging cleaned boots, avoiding smelling samples and placing samples near your mouth and touching your face and mouth area whilst wearing soiled gloves, and to stand upwind of excavations to avoid dust and gases.

The guidance note makes reference to The British Drilling Association's site categorisation scheme (green, yellow or red) which should be determined based on the desk study (BDA 2008). AGS has also published a comment document on the BDA 2008 Guidance for safe intrusive activities on contaminated or potentially contaminated land. The document is available from the AGS website [here](#). The guidance classifies red sites as the most hazardous, attributing this classification to sites where there are:

'Substances that could subject persons to risk of death, injury or impairment of health. Examples would be any substances that are corrosive, acidic, carcinogenic, cause skin irritation or respiratory problems, affect the nervous system, affect the organs, etc.'

The guidance is based on the hazard only, it takes no account of the concentrations of contaminants present which are critical to determining the risk category. Many former industrial sites would have contaminants/hazardous substances present and consequently many sites under this categorisation would be classed as 'red' sites which is clearly unduly conservative.

One of the objectives of a site investigation is to find out what hazards are in the ground and until this is done it is not possible to produce a definitive risk assessment and only assumptions can be made. It is therefore important that a thorough desk study and site inspection is carried out and reference is made to publications used commonly to determine the potential presence of substances for the purposes of human health risk assessment. However the mere potential for the presence of a hazardous substance to exist in contaminated ground does not mean there is an occupational risk.

A health and safety risk assessment for site investigation is qualitative based likelihood and severity. The desk study should provide information about the types and locations of potential sources of contaminants or hazards and allow the likely severity to be assessed. Combined with the knowledge of the location and type of exploratory holes an assessment of the likelihood can be made. A risk rating can then be produced from which a decision can be made regarding the control measures and whether it is to be classified as green, yellow or red under the BDA Guidance.

"The guidance is based on the hazard only, it takes no account of the concentrations of contaminants present which are critical to determining the risk category..."



Ground gas protection

Over the last few decades there have been a number of accreditation schemes which have been developed in the land contamination sector which have helped to improve standards. Examples include the Specialist in Land Condition ([SiLC](#)), Register of Ground Engineering Professionals ([RoGEP](#)), Suitably Qualified Person ([SQP](#)) associated with the National Quality Mark Scheme ([NOMS](#)) and Qualified Person ([QP](#)) associated with the Definition of Waste Code of Practice ([DoWCoP](#)). However, regulators and professionals working in the land contamination sector noticed that the quality of ground gas protection installation and verification work is highly variable and in some situations, not fit for purpose. Given that this is a specialised area those working in the industry considered that an accreditation scheme to improve the quality of gas protection verification was necessary.

CL:AIRE has launched the Gas Protection Verification Accreditation Scheme ([GPVS](#)) in order to raise standards regarding the installation of gas protection membranes including the inspection, verification and reporting of their installation. The scheme is applicable for use within the Town and Country Planning and Building Control regimes primarily, although it could be used in circumstances where properties require retrofitting or to support defences against potential claims.

The scheme is intended to demonstrate that where the scheme has been followed the potential risks associated with ground gases as part of a site development have been adequately managed and that the verification of the works confirms that they meet the necessary technical and regulatory standards. The scheme applies to both the practical installation of the ground gas mitigation measures and to the verification reporting process as often different personnel undertake these tasks. There are two accreditation routes to demonstrate competence 'Specialist in Gas Protection Verification' (SGPV) and 'Technician in Gas Protection Verification' (TGPV).

TGPV is aimed at field technicians who carry out inspections on site and SGPV is aimed at those involved in the whole range of gas protection verification and who are deemed competent to prepare and sign off validation reports under the GPVS scheme. The SGPV accreditation is also recognised under the Construction Skills Certification Scheme (CSCS). A register of all SGPVs is available on the CL:AIRE website.

In order to be able to apply the Quality Mark under the GPVS, the SGPV accredited person is required to purchase, complete and sign a GPVS Declaration and attach it to the verification report. The application of the quality mark indicates that the work has been undertaken by recognised, competent professionals and that the SGPV has verified that the work has been carried out in accordance with industry standards.

Guidance relating to hazardous ground gas published over the last few decades is associated predominately with the assessment, design and construction of gas protection measures to new buildings. CIRIA has issued guidance entitled 'Retrofitting hazardous ground gas protection measures in existing or refurbished buildings (C795)' in January 2021. This new guidance is focused on retrofitting ground gas protection measures in existing buildings where these measures previously were absent, inadequate or faulty, as well as buildings subject to extension or refurbishment.

The guidance refers to hazardous ground gas as an overarching term to refer to methane, carbon dioxide and carbon monoxide, volatile organic compounds (VOC) and radon.

“The application of the quality mark indicates that the work has been undertaken by recognised, competent professionals...”



“The document refers to observations for ‘tell-tale signs’ such as disused fuel dispensers, off set fill points and vent pipes...”

Before You Dig

The document ‘Before You Dig, Garages & Petrol Stations, Guidance for Developers’ has been prepared by EPUK. It is aimed at those planning to carry out groundworks or redevelopment activities and provides a general guide regarding typical hidden infrastructure and associated ground contamination that may be present at petrol filling stations. Although the document is focussed on petrol filling stations and garages, underground storage tanks and associated underground infrastructure can be present on a range of industrial and commercial facilities where vehicle servicing and refuelling activities have taken place. The document is available from the EPUK website [here](#).

Section 4 in the document presents a summary of contamination issues associated with garages and petrol filling stations and the need for intrusive investigations which are associated with due diligence generally as part of a transfer or sale of the site to assess development viability and/or environmental liabilities, to investigate known and suspected significant pollution incidents (for example observed pollution of a nearby watercourse, vapours in a nearby building and as a result of variations in stock reconciliation records) and to address planning conditions prior to site redevelopment.

As part of a desk study assessment a key source of information about the site can be obtained from the Petroleum Licensing Authority which is the Local Authority generally although in some areas it is the Fire Service. Petroleum licensing is necessary only for the storage of petrol although the fuel stored in underground tanks was often changed between diesel and petrol and sometimes kerosene (paraffin). The details of these available records vary although sometimes they can be helpful to identify underground tanks that are no longer in use and which may still be on the site, sometimes covered over by surfacing. The document refers to observations for ‘tell-tale signs’ such as disused fuel dispensers, off set fill points and vent pipes, each one often serves a separate or part of a divided underground storage tank.

Making observations inside access chambers may reveal tank access points and allows an assessment of the general condition to be made for example significant staining and oily residues observed in drainage or at fill points. Other infrastructure to look out for are interceptors which are often identified by three aligned access covers. Where there are disused tanks these may be temporarily filled with water or permanently decommissioned by filling with concrete or specialist foam.

In Section 5 of the document there are some general safety and environmental precautions listed associated with groundworks and remediation works on such sites.

The guidance document provides only a broad overview of the issues associated with these types of sites which may be helpful for potential developers with little or no experience of dealing with such sites to understand the many problems that can be associated with contamination at such sites. However, for companies undertaking site assessments there are other technical guidance documents that are more relevant and detailed.



Comparing Soil Contamination Data with a Critical Concentration

CL:AIRE has published a document "Professional Guidance: Comparing Soil Contamination Data with a Critical Concentration". The guidance updates a 2008 document published by CL:AIRE and the Chartered Institute of Environmental Health. The document is available from the CL:AIRE website [here](#).

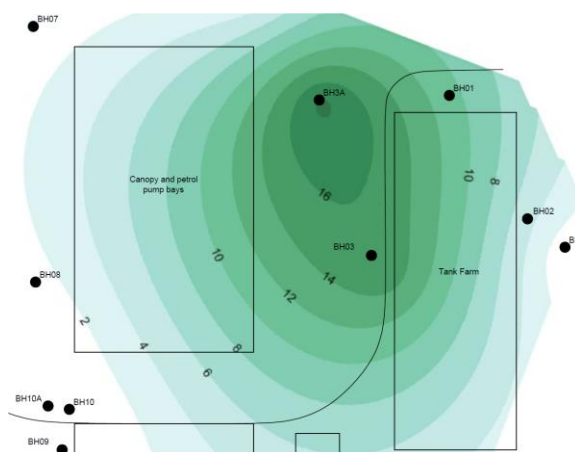
The new guidance adopts an entirely different approach to the previous 2008 guidance which has now been withdrawn. The 2020 revision addresses the problem of potentially erroneous conclusions by dropping the reliance on a single scientific test and emphasises the importance of a comprehensive understanding of the datasets in the context of the conceptual site model (CSM). Although the 2008 guidance highlighted the importance of the CSM and an understanding of the datasets involved, ultimately the application of the scientific test provided a definitive yes/no answer (referred to as the bright line) to the question posed. The validity of applying scientific tests based on comparing a measure of the probability that an observed difference could have occurred just by random chance (a p-value) to a pre-determined significance level has been challenged by statisticians relating to the application of statistics in scientific research and considered that the "bright-line" approach can lead to over simplistic and erroneous conclusions when the datasets are not fully understood.

This 2020 guidance does not place reliance on a single scientific test and emphasises the importance of a comprehensive understanding of the datasets in the context of the CSM, not least to question if there is sufficient statistical expertise available to evaluate the data and establish if the dataset is adequate to answer the question posed for the site.

The guidance introduces three datasets to illustrate the guidance for a scenario for Part 2A of the Environmental Protection Act and two datasets for a planning scenario. All recommended statistical calculations and charts on how to summarise and present data can be prepared on an Excel spreadsheet. The guidance sets out how to interpret the results and explains how to draw conclusions from the calculations and charts. The main tool which is used to draw conclusions is a 2-way confidence interval associated with the critical concentration, for example a generic guideline criterion. The comparisons are not straightforward and there is a need to exercise judgement over a number of other factors that have to be taken into account before making a decision.

The guidance may prove helpful where there is a need to assess the potential risk to site users beyond the use of generic assessment criteria although a good understanding of the application of statistics in the assessment of contaminated land together with a robust conceptual site model is necessary.

$$\sigma_N = \sqrt{\frac{1}{N} \sum_{i=1}^N (x_i - \bar{x})^2}$$



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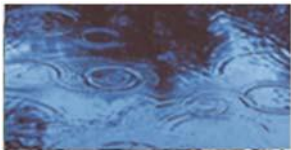
CONTACT US

Please contact [Kate Eaton](#) for more information on any of the issues raised in this newsletter, or on any other Contaminated Land issues.

Asbestos in soils

HSE has recently published a revised version of Asbestos: The Analyst's Guide (HSG 248). The guidance has been updated to take account of findings from Health and Safety Executive (HSE) interventions and developments in analytical procedures and methodology. It provides clarification on technical and personal safety issues, especially in relation to sampling and 4-stage clearances. Also, there is new information on sampling soils for asbestos. The document can be downloaded [here](#).

The guidance is designed to assist analysts in complying with their legal obligations although it is also helpful to asbestos consultants, occupational hygienists, safety professionals, asbestos removal contractors, building owners and facilities managers.



HSG 248 now states:

"There is no blanket requirement for surveying, soil sampling and analysis for asbestos during land development under CAR. The survey requirement under CAR only applies where there is a work context. CAR does not require asbestos surveys for environmental risk assessments or for public health reasons. Other legislation may require asbestos soil surveys.

To prevent unnecessary duplication of effort, the assessment for soil and made ground work under CAR is intended to complement the requirements of other regulatory regimes including the determination of contaminated land under Part 2A of the Environmental Protection Act 1990 and the Controlled Waste (England and Wales) Regulations 2012, and for planning/development of land. As noted in the introduction [to HSG248], this guidance is also intended to be compatible with industry written guidelines prepared by the Joint Industry Working Group on Asbestos in Soils [CAR-SOIL]."